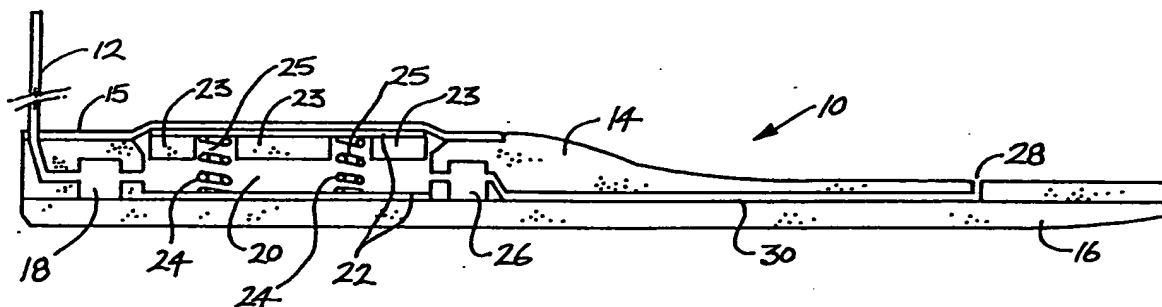




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<p>(21) International Application Number: PCT/AU89/00164</p> <p>(22) International Filing Date: 18 April 1989 (18.04.89)</p> <p>(30) Priority data: 14735/88 18 April 1988 (18.04.88) AU</p> <p>(71)(72) Applicant and Inventor: KUZMIC, Zdravko, Mario [AU/AU]; Unit 75, 16 Leeder Street, Glendalough, W.A. (AU).</p> <p>(74) Agent: LORD, Kelvin, Ernest; 4 Douro Place, West Perth, W.A. 6005 (AU).</p> <p>(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US.</p>		<p>Published With international search report.</p>

(54) Title: APPARATUS FOR VENTILATING FOOTWEAR



(57) Abstract

Apparatus (10) for ventilating footwear having an air chamber (20) formed as part of the sole or inner sole of an item of footwear. An inlet valve (18) and an outlet valve (26) are provided to control passage of air to and from the air chamber (20). An inlet (12) communicates with the inlet valve (18) and an outlet comprising at least one outlet aperture (32) communicates with the outlet valve (26). The air chamber (20) comprises a variable volume enclosing one or more resilient members (24) such that a substantial portion of the air chamber (20) is left unoccupied. The apparatus (10) is configured such that the volume of the air chamber (20) is varied by periodic placement of weight on the air chamber (20) so as to cause the variable volume to expand and contract. This causes air to be drawn through the inlet (12) and pumped through the outlet aperture (32) and distributed around the foot of the wearer.

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TITLE

"APPARATUS FOR VENTILATING FOOTWEAR"

DESCRIPTION

The present invention relates to an apparatus for
5 ventilating footwear, such an apparatus being either built
in to the footwear, or provided as an attachment or insert
for insertion into footwear.

FIELD OF THE INVENTION

The apparatus of the present invention allows air to flow
10 in the footwear whilst being worn by a person. The
provision of this flow of air adds to the comfort of the
wearer.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention
15 there is provided an apparatus for ventilating footwear
comprising an air chamber formed as part of the sole or
inner sole of an item of footwear, an inlet valve means and
an outlet valve means to control passage of air to and from
the air chamber, an inlet means communicating with the
20 inlet valve means, an outlet means communicating with the
outlet valve means, the outlet means comprising at least
one outlet aperture, the air chamber further comprising a
variable volume enclosing one or more resilient members,
such that a substantial portion of the air chamber is left
25 unoccupied, the apparatus being configured such that the
volume of the chamber is varied by periodic placement of
weight on the air chamber so as to cause the variable
volume to expand and contract thus causing air to be drawn
through the inlet means and pumped through the outlet

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means and distributed around the foot.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a sectional side view of an apparatus in accordance with the present invention;

5 Figure 2 is a sectional plan view of the apparatus of Figure 1;

Figure 3 is a sectional view of a valve means for use in the apparatus of the Figures 1 and 2; and

Figure 4 is a side view along line 4-4 of the valve means
10 of Figure 3.

DESCRIPTION OF THE INVENTION

Shown in Figures 1 and 2 is an apparatus 10 for ventilating footwear. The apparatus 10 comprises an air inlet means 12, which is typically a flexible tube. The apparatus 10
15 further comprises an upper layer 14 spaced from a lower layer 16. The upper layer 14 further comprises an additional layer 15 overlaying the portion of the layer 14 containing an air chamber, to be described hereinafter.

It is envisaged that the layer 15 is to be composed of a
20 relatively soft layer to give it some resilience. The layer 14 may typically be composed of a foam rubber to produce a cushioning effect for the foot. The layer 16 may be composed of a relatively strong material, of the type used for shoe soles. This would give the layer 16 a
25 measure of abrasion resistance. The inlet means 12 is in communication with an inlet valve means 18 located between the layers 14 and 16 which in turn communicates with a chamber 20 also located between the layers 14 and 16.

The air chamber 20 comprises upper and lower seating plates

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22 composed of a relatively stiff material, typically hard plastics, each located adjacent a respective layer 14 and 16. The air chamber 20 further comprises a piston member 23 preferably attached to a seating plate 22. It is
5 preferred that the piston member 23 be composed of a non-porous resilient material. Additionally, the piston member 23 has a plurality of transverse apertures 25, preferably extending therethrough.

Between the plates 22 are located a plurality of resilient
10 members 24 typically coil springs, the resilient members 24 being disposed so as to resiliently space the seating plates 22. Further, each resilient member 24 is partially contained within one of the apertures 25. The apertures 25 serve to locate the resilient members 24 and prevent
15 buckling of the same.

The resilient members 24 are disposed in the air chamber 20 such that a substantial portion of the air chamber 20 is left unoccupied.

The air chamber 20 is in communication with an outlet valve
20 means 26 located between the layers 14 and 16. The outlet valve means 26 in turn communicates with an outlet duct 28 via a conduit 30.

The conduit 30 is located between the layers 14 and 16, preferably adjacent the layer 16.

25 The outlet duct 28 comprises a plurality of apertures 32 arranged to discharge air through the layer 14, preferably near the toe region of the footwear.

It is preferred, in the present embodiment, that the air chamber 20 be located in the heel region of the footwear,

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though other locations may be used in accordance with the present invention.

Shown in Figures 3 and 4 of the accompanying drawings is a valve means 18, 26 envisaged for use with the apparatus of the present invention. The valve means 18, 26 comprises a body 40 having an inlet 42, an outlet 44 and a chamber 46 therebetween.

Located within the chamber 46 is a moveable member 48. The member 48 has a first end 50 shaped to sealingly fit into the inlet 42. The member 48 also has a second end 52 shaped so as to not sealingly fit into the outlet 44.

Preferably, the outlet 14 further comprises a plurality of curved arms 45 extending partially across the outlet 44.

The member 48 is preferably composed of a light material so as to be moved by relatively low air velocities.

Thus, the valve means 18, 26 permit air flow in one direction only from the inlet 42 to the outlet 44. Air flow in the reverse direction causes the member 48 to sealingly engage with the inlet 42.

In use the apparatus 10, of the present invention, is either integrally formed with or inserted into an item of footwear (not shown) such that the lower surface 16 is adjacent the sole of the item of footwear.

The wearer of the footwear places his weight on the upper surface 14. This urges the upper surface 14 towards the lower surface 16. The displacement continues until either the piston member 23 contacts the seating plate 22 adjacent the lower surface 16, or the weight of the wearer is balanced by the compression of the resilient members 24.

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When the resilient members 24 comprise coil springs the seating plates 22 being of a relatively stiff material, prevent the coil springs from penetrating into the foot of the wearer or through the lower surface 16.

5 This displacement causes the volume of the chamber 20 to decrease. Air is then expelled through the outlet valve means 26 since air cannot flow out of the inlet valve means 18 due to the one way flow characteristics described hereinbefore.

10 The air travels along the conduit 30 to the outlet duct 28 where the air is discharged at relatively high velocity through the apertures 32. In such a manner, fresh air is introduced into the toe region of the footwear. The fresh air cools and ventilates the foot of the wearer as well as
15 removing undesirable odours.

The wearer then removes his weight from the upper surface 14.

The resilient members 24 urge the upper surface 14 away from the lower surface 16. This causes the volume of the
20 chamber 20 to increase.

Air is then admitted to the chamber 20 via the inlet means 12 and the inlet valve 18. Air cannot be drawn into the chamber 20 through the outlet valve means 26 due to the one way flow characteristics of the valve means 18 and 26
25 described hereinbefore.

A substantial portion of the air chamber 20 is available as a working volume since the only parts located therein are the resilient members 24. This enables substantially the entire volume of the air chamber 20 to be available for

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admission and expulsion of air therefrom.

The apparatus of the present invention provides a compact and efficient means of ventilating, and is particularly applicable to sports shoes.

5 Modifications and variations such as would be apparent to a skilled addressee and deemed within the scope of the present invention.

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CLAIMS

1. Apparatus for ventilating footwear characterised in that it comprises an air chamber formed as part of the sole or inner sole of an item of footwear, an inlet valve means
5 and an outlet valve means to control passage of air to and from the air chamber, an inlet means communicating with the inlet valve means, an outlet means communicating with the outlet valve means, the outlet means comprising at least one outlet aperture, the air chamber further comprising a
10 variable volume enclosing one or more resilient members, such that a substantial portion of the air chamber is left unoccupied, the apparatus being configured such that the volume of the air chamber is varied by periodic placement of weight on the air chamber so as to cause the variable
15 volume to expand and contract thus causing air to be drawn through the inlet means and pumped through the outlet means and distributed around the foot.
2. Apparatus for ventilating footwear according to Claim 1, characterised in that said air chamber comprises a pair
20 of seating plates and said one or more resilient members are positioned between said pair of seating plates to bias said pair of seating plates apart.
3. Apparatus for ventilating footwear according to claim 2, characterised in that said air chamber comprises piston
25 means attached to at least one of said seating plates.
4. Apparatus for ventilating footwear according to Claim 3, characterised in that said piston means comprises at least one aperture to receive an end of said at least one

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resilient member.

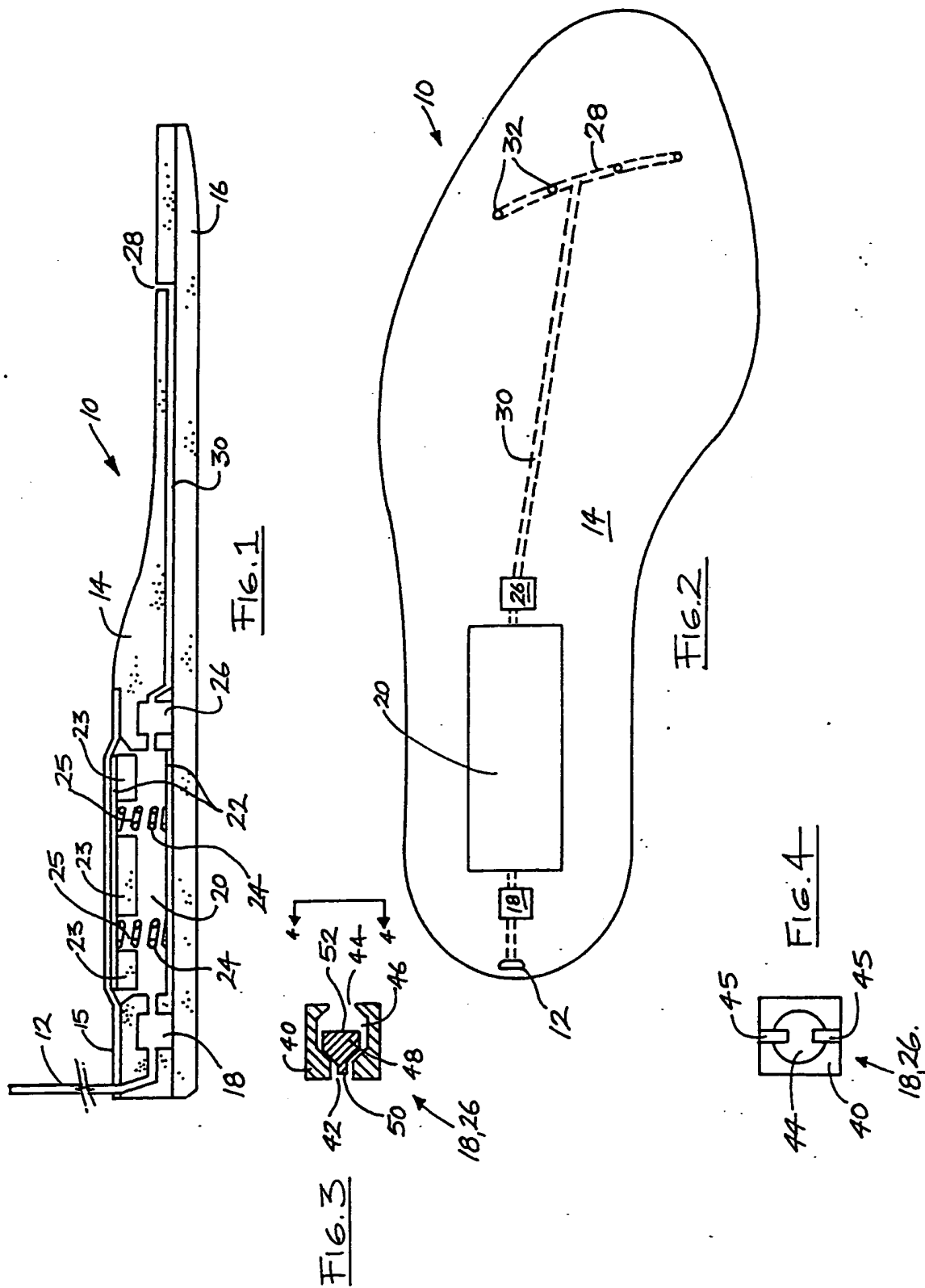
5. Apparatus for ventilating footwear according to any one of claims 1 to 4, characterised in that said inlet and outlet valve means are disposed adjacent respective ends of said air chamber.

6. Apparatus for ventilating footwear according to any one of claims 1 to 5, characterised in that it further comprises upper and lower material layers between which said air chamber is disposed and said inlet and outlet valve means are disposed in said upper layer.

7. Apparatus for ventilating footwear according to any one of claims 1 to 6, characterised in that when weight is placed on said air chamber, air is unable to flow through said inlet valve means and air is forced from said air chamber through said outlet valve means to exit through said outlet means.

8. Apparatus for ventilating footwear according to Claim 7 characterised in that said inlet and outlet valve means each comprises a body having a valve inlet and a valve outlet disposed at opposed ends of a valve chamber containing a moveable member wherein when said moveable member moves adjacent said valve inlet air is unable to flow through said valve means and when said moveable member moves adjacent said valve outlet air is able to flow through said valve inlet through said valve chamber and out of said valve outlet.

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INTERNATIONAL SEARCH REPORT

International Application No. PCT/AU 89/00164

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) 6				
According to International Patent Classification (IPC) or to both National Classification and IPC				
Int. Cl. ⁴ A43B 7/06, A43B 13/20				
II. FIELDS SEARCHED				
Minimum Documentation Searched 7				
Classification System	Classification Symbols			
IPC	A43B 7/06; A43B 13/20			
Documentation Searched other than Minimum Documentation to the extent that such documents are included in the fields searched 8				
AU : IPC as above				
III. DOCUMENTS CONSIDERED TO BE RELEVANT 9				
Category*	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages 12	Relevant to Claim No 13		
X,P	US,A,4760651 (PON-TZU) 2 August 1988 (02.08.88)			
X,P	US,A,4776110 (SHIANG) 11 October 1988 (11.10.88)			
X	US,A,4224746 (KIM) 30 September 1980 (30.09.80)			
X	GB,A,2073006 (ENERGY SHOE CO) 14 October 1981 (14.10.81)			
X	GB,A,2193080 (HEMMINGS) 3 February 1988 (03.02.88)			
X	GB,A,2165439 (CALDWELL) 16 April 1986 (16.04.86)			
X	WO,A,86/03951 (SARKAF) 17 July 1986 (17.07.86)			
X	WO,A,87/03789 (SCIENTIFIC APPLIED RESEARCH (SAR) PLC) 2 July 1987 (02.07.87)			
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A	WO,A,87/05784 (OUIN) 8 October 1987 (08.10.87)			
A	DE,A,3012945 (KEBER) 23 October 1980 (23.10.80)			
A	DE,A,3701826 (CHOW) 22 October 1987 (22.10.87)			
A	DE,A,2809011 (WEBER) 30 August 1979 (30.08.79)			
A	US,A,4129951 (PETROSKY) 19 December 1978 (19.12.78)			
<p>* Special categories of cited documents: 10</p> <table style="width: 100%;"> <tr> <td style="width: 50%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Z" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Z" document member of the same patent family</p>
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IV. CERTIFICATION				
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report			
6 July 1989 (06.07.89)	8 August 1989			
International Searching Authority	Signature of Authorized Officer			
Australian Patent Office	B.R. DASHWOOD			